CONFIDENTIAL—FINAL REVISE
[to be published as House of Commons Paper 61–I by HMSO Price £9·80 net]

HOUSE OF COMMONS SESSION 1990–91

ENVIRONMENT COMMITTEE

Sixth Report

INDOOR POLLUTION

Volume I

Report, together with the Proceedings of the Committee relating to the Report

2504086162

This Document is issued in advance on the strict understanding that no approach is made to any organisation or person about its contents before the time of publication.

NOT FOR PUBLICATION, BROADCAST OR USE ON CLUB TAPES BEFORE:—
09.30 Hours BST on Wednesday 10 July 1991

2020032686

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

The Environment Committee is appointed under SO No. 130 to examine the expenditure, administration and policy of the Department of the Environment and associated public bodies.

The Committee consists of 11 Members. It has a quorum of three. Unless the House otherwise order, all Members nominated to the Committee continue to be members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other such committee its evidence and any other documents relating to matters of common interest; and

(d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

The membership of the Committee since its appointment on 2 December 1987 has been as follows:

Sir Hugh Rossi (Chairman)

Mr John Battle (appointed 9.5.91)
Mr Henry Bellingham (discharged 18.3.91)
Mr Paul Boateng (discharged 19.12.89)
Mr John Cummings
Mr Richard Holt
Mr George Howarth (appointed 19.12.89, discharged 16.5.90)
Mr Ralph Howell (appointed 18.3.91)
Dr Kim Howells (appointed 16.5.90, discharged 9.5.91)
Mr Andrew Hunter
Mr Robert B. Jones
Mr Terry Lewis (appointed 26.10.90)
Mr Keith Mans (discharged 18.3.91)
Mr Tom Pendry
Mr Peter L. Pike (discharged 26.10.90)
Mr Robin Squire (discharged 18.3.91)
Mr Anthony Steen (appointed 18.3.91)
Mr Hugo Summerson (appointed 18.3.91)

2504086163

The cost of printing and publishing this Report is estimated by HMSO at £6,972-00.
The cost of preparing for publication the Shorthand Minutes taken before the Environment Committee and published with this Report was £6,637-38.

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

TABLE OF CONTENTS

Volume I

		Page
LIST OF WITNESSES		iv
LIST OF MEMORANDA INCLUDED IN THE MINUTES OF EVIDENCE		v
LIST OF APPENDICES TO THE MINUTES OF EVIDENCE		vi
LIST OF PAPERS REPORTED TO THE HOUSE AND NOT PRINTED BUT DEPOSITED IN THE LIBRARY OF THE HOUSE AND THE RECORD OFFICE OF THE HOUSE OF LORDS		viii
REPORT		ix
	Paragraphs	
Preface	1–7	ix
Summary of recommendations	6	xi
Introduction	9–14	xiv
Buildings and indoor air quality	15–21	xiv
Health and indoor air quality	22–23	xvii
The scale of the problem	24–28	xvii
Government and legislation	29–36	xviii
Guidelines on indoor air quality	37–42	xx
Implementation	43–48	xxi
Commercial buildings and sick building syndrome	49–53	xxii
What is "sick building syndrome"?	53–69	xxiii
Maintenance	69–74	xxvi
Building regulation	75–78	xxvii
Comfort and health	79	xxviii
Energy efficiency and indoor air quality	80–82	xxix
BRE Environmental Assessment Method	83–84	xxix
Environmental tobacco smoke	85–98	xxxi
Radon	99–102	xxxiv
The impact of radon	103–109	xxxiv
Surveys	110–113	xxxvii
Confidentiality	114–115	xxxviii
Local authorities and radon	116–119	xxxviii
Remedial action and financial assistance	120–124	xxxix
Damp and condensation	125–135	xl
Toxic substances	136	xlii
Conclusion	137–138	xlii
PROCEEDINGS OF THE COMMITTEE RELATING TO THE REPORT		xliii
MINUTES OF EVIDENCE (Volume II)		1
APPENDICES TO THE MINUTES OF EVIDENCE (Volume II)		279

2504086164

211040 B*

20200032688

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

LIST OF WITNESSES

Volume II

Page

Wednesday 16 May 1990

DEPARTMENT OF THE ENVIRONMENT

Dr D J Fisk, Dr M Jones, Mr G I Fuller and Dr D J Bryce 19

Wednesday 13 June 1990

NATIONAL RADIOLOGICAL PROTECTION BOARD

Mr Michael O'Riordan and Mr Jonathan Miles 45

Wednesday 18 July 1990

HEALTHY BUILDINGS INTERNATIONAL, INC

Mr Gray Robertson 76

Wednesday 25 July 1990

HEALTH AND SAFETY EXECUTIVE

Dr J T Carter, Dr J McGuiness, Mr J Sykes and Mr B Ross 94

Wednesday 28 November 1990

CHARTERED INSTITUTION OF BUILDING SERVICES ENGINEERS

Mr Andrew Ramsay, Mr Peter Jackman, Mr Paul Appleby and Mr Peter Scurry .. 127

Wednesday 5 December 1990

CARRICK DISTRICT COUNCIL

Mr John Mellor and Miss Catherine Frances 143

Wednesday 12 December 1990

UNIVERSITY OF BRISTOL

Dr Denis L Henshaw, Mr Richard B Richardson and Mr Jonathan Eatough 171

Wednesday 19 December 1990

ASH (ACTION ON SMOKING AND HEALTH)

Mr David Simpson OBE, Mr Mark Flannagan, Professor Sir Richard Doll OBE FRS and Dr Noel Olsen 187

BRITISH-AMERICAN TOBACCO COMPANY LIMITED

Dr Sharon Boyse and Dr Christopher Proctor 215

Wednesday 16 January 1991

BUILDING RESEARCH ESTABLISHMENT

(At the Building Research Establishment, Garston, Watford)

Mr R Courtney, Mr N Milbank, Mr A Butler, Dr J W Llewellyn, Dr S Wozniak and Dr G Raw 232

Monday 21 January 1991

INSTITUTION OF ENVIRONMENTAL HEALTH OFFICERS

Mr Graham Jukes, Mr Stephen Battersby, Dr Martin Courtis and Mr Alan Blythe .. 250

Wednesday 30 January 1991

DEPARTMENT OF THE ENVIRONMENT

Mr David Trippier, RD JP MP, Dr David Fisk and Dr Martin Jones 263

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

LIST OF MEMORANDA INCLUDED IN THE MINUTES OF EVIDENCE

Volume II

		Page
1.	Memorandum by the Department of the Environment	1
2.	Memorandum by the National Radiological Protection Board	40
3.	Memorandum by Healthy Buildings International Inc	59
4.	Memorandum by the Health and Safety Executive	89
5.	Memorandum by the Chartered Institution of Building Services Engineers ..	117
6.	Memorandum by Building Health Consultants	124
7.	Memorandum by Officers of Carrick District Council	139
8.	Memorandum by Dr Denis L Henshaw	154
9.	Memorandum by Ash (Action on Smoking and Health)	179
10.	Memorandum by the British-American Tobacco Company Limited	197
11.	Memorandum by the Building Research Establishment	226
12.	Memorandum by the Institution of Environmental Health Officers	243

2504086166

Z0200032690

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

22:07 '91 10:25 ☎61 02 259 6643 WILLS LEG SEC →→→ PHILIP MORRIS 007
18 JUL '91 11:20 B A T 3RD FLOOR 071 222 5816 P.7/25

LIST OF APPENDICES TO THE MINUTES OF EVIDENCE

		Page
1.	Memorandum by the Banking, Insurance and Finance Union	279
2.	Memorandum by the British Occupational Hygiene Society and Indoor Air International	283
3.	Memorandum by the Confederation of British Industry	287
4.	Memorandum by the Council of Civil Service Unions	289
5.	Memorandum by Friends of the Earth	291
6.	Memorandum by the Health Education Authority	300
7.	Memorandum by the Service and Maintenance Group of the Heating and Ventilating Contractors' Association	305
8.	Memorandum by the National Asthma Campaign	307
9.	Memorandum by the Natural Environment Research Council	309
10.	Memorandum by the Parliamentary Office of Science and Technology	311
11.	Memorandum by the Robens Institute, Occupational Health Unit	318
12.	Memorandum by the Soil Survey and Land Research Centre	321
13.	Memorandum by the Trades Union Congress	323
14.	Memorandum by Winton Air and Water Management	330
15.	Memorandum by the Borough Council of Wellingborough	337
16.	Memorandum by Cornwall County Council	340
17.	Memorandum by Mendip District Council	342
18.	Memorandum by Somerset County Council	344
19.	Memorandum by Dr K F Baverstock, Medical Research Council Radiobiology Unit	345
20.	Memorandum by Professor Peter Burberry, Department of Building Engineering, UMIST	350
21.	Memorandum by Dr P Sherwood Burge, Solihull Hospital	353
22.	Memorandum by Dr R A Cartwright, Leukaemia Research Fund Centre	354
23.	Memorandum by Professor Alan Hedge, Facilities Diagnostics	355
24.	Memorandum by Dr Phillip Jones, University of Wales	360
25.	Memorandum by Professor P O'Sullivan and Dr T Oreszczyn, University College, London	365
26.	Memorandum by Mr Charles Ryder	367
27.	Memorandum by the Department of Health	368
28.	Supplementary Memoranda by the British-American Tobacco Co Ltd	
	(i) Environmental Tobacco Smoke Levels in Public Houses	377
	(ii) Building Ventilation Standards for Indoor Air Quality	380
	(iii) The Low Level Exposure to Chemicals Claimed to be Carcinogens	384
29.	Supplementary Memorandum by the Health and Safety Executive	387
30.	Supplementary Notes by the Institution of Environmental Health Officers	392

2504086167

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

22/07 '91 10:26 61 02 259 6643 WILLS LEG SEC --- PHILIP MORRIS 008
18 JUL '91 11:20 5TH 1 3RD FLOOR 071 222 5815 P.8/25

		Page
31.	Supplementary Notes by the Department of the Environment	
	(i) Framework of Legislation Covering Indoor and Outdoor Pollution	393
	(ii) Indoor Pollution: Departmental Responsibilities	393
	(iii) Leaflets Update	395
	(iv) Sick Building Syndrome	395
	(v) St John's House, Bootle	396
	(vi) The Statutory Division of Enforcement Responsibilities	397
	(vii) Carrick District Council's inaccurate account of the House Renovation Grants System	398
	(viii) Response by the Department of the Environment to the Memorandum submitted by the Institution of Environmental Health Officers	398
	(ix) Information for the Committee arising from the evidence session with Mr Trippier on 30 January 1991	399
	(x) Comparisons between National Radon Programmes	401
32.	Supplementary Note by the National Radiological Protection Board	403
33.	Supplementary Notes by the Building Research Establishment	404
34.	Memorandum by Mr David Lush, Technical Director, Ove Arup Partnership and Specialist Adviser	407
35.	Further Memorandum by Professor Alan Hedge, Facilities Diagnostics	416
36.	Memorandum by the Royal Society of Health	426
37.	Note by the South Western Regional Health Authority	429

2504086168

210040 C*

Z0200032692

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

UNPUBLISHED MEMORANDA

Additional memoranda have been received from the following and have been reported to the House, but to save printing costs they have not been printed and copies have been placed in the House of Commons Library where they may be inspected by Members. Other copies are in the Record Office, House of Lords, and are available to the public for inspection. Requests for inspection should be addressed to the Record Office, House of Lords, London SW1 (telephone 071-219 3074). Hours of inspection are from 9.30 am to 5.00 pm on Mondays to Fridays:

Association for Nonsmokers' Rights, Dorset Branch

Mr Mike Bailey, Occupational Safety Adviser, London School of Hygiene and Tropical Medicine

Dr Cameron Bowie and Dr Stanley H U Bowie

British Property Federation

Mr J H Brock

Environmental Monitoring Services

Dr David Goodacre

Dr Alan Hedge, Associate Professor, Cornell University and Partner, Facilities Diagnostics

The Institute of Gas Engineers

LSS

Manchester City Council, Environmental Health and Consumer Protection Department

Angela Mawle, ICCET

Dr Jean Monro, Medical Director, Breakspear Hospital for Diagnostic Medicine, Allergy and Environmental Medicine

The Radon Council

Rentokil Group plc

Tobacco Advisory Council

Mr F J Webb, Secretary, Radon South West Committee

2504086169

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

SIXTH REPORT

INDOOR POLLUTION

The Environment Committee has agreed to the following Report:

PREFACE

1. We found this to be one of our most challenging inquiries. We know that questions of indoor air quality are important for comfort and health but firm facts are elusive. A wide range of individuals and bodies from very different backgrounds have given us evidence and much of this is confusing and contradictory. There is a tendency for each expert to know about the subject from his or her own point of view (for example as a microbiologist or ventilation system contractor) with little or no understanding of other aspects. We have endeavoured to sift the evidence and provide pointers for areas where work is needed to guide future policy development.

2. In contrast to other pollution problems which we have studied, responsibility for indoor pollution is spread across a large number of Government departments. It became clear very early in our questioning that this has been very much to the detriment of policy development in this area. The amount of departmental activity on their respective responsibilities varied considerably. In several instances, we found that a policy was applied in a limited manner simply because it fell within another department's remit which had deemed it to be of lesser importance. We look to the Government now, in response to our report, to initiate core research and policy reviews which will underpin future policy in this area across all the departments with responsibilities impinging on indoor air quality. Research work and reviews on this issue which are artificially bounded by departmental restrictions are of little value.

3. Indoor air quality issues have been neglected. The main reason for this appears to be lack of awareness of the problem because the effects are mostly chronic and long-term and are not directly and immediately life-threatening. The evidence which we received from the Health and Safety Executive certainly reflected this. They have paid little attention to air-quality except for toxic fumes in factories. They indeed rarely visited offices and then only in response to incidents such as injury from a lift failure. Their attitude was that air condition which was more equated to comfort than health was solely the responsibility of the employer. HSE told us that they had to justify their work in terms of costs and benefits and could not be distracted by what they clearly regarded as esoteric exercises. We agree that it is of the utmost importance that money is not to be wasted on achieving some minuscule reduction in risk. However, we consider that the failure to appreciate the importance of indoor air quality results in lack of proper attention being paid to chronic conditions which result in reduced health and efficiency for many people over long numbers of years and which may have a greater economic impact than more life-threatening conditions.

4. People spend long periods indoors, and both at home and at work the indoor environment is becoming increasingly artificial. There is also considerable ignorance about actions which can ensure that the environment remains healthy: ventilators are blocked up with impunity; air-conditioning systems are ill-maintained and badly operated. Very little is known about the chemicals in use every day, such as hair sprays and typing correction fluids nor of the vapours exuded from synthetics used in modern buildings which linger in the indoor atmosphere, and particularly little is known of their effects in combination over long periods. There is a contrast here with the situation in the external environment where sophisticated modelling is used to predict the behaviour and impacts of pollutants. The same effort has not been put into understanding the internal environment and its effect upon occupants.

5. We received evidence that many people are dissatisfied with the air quality in their places of work. In addition, there is evidence that conditions which may be associated with indoor air quality such as asthma and allergies are increasing in the population. There is considerable ignorance about indoor air quality in the design, construction, use and maintenance of buildings and there is at present no clear definition of a healthy and comfortable internal environment.

6. The evidence we have received suggests that building designers, operators and users need guidance and standards to ensure that a healthy and comfortable environment is maintained indoors. Without these, inevitably, given the fact that problems are hard to detect, indoor air quality issues will lose out to other competing pressures, such as greater energy efficiency or other economies. We consider that appropriate guidance and codes of practice on the design and

2504086170

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

operation of healthy buildings can be fairly readily provided under existing legislation. Employers already, in law, have to provide a healthy and safe environment which is effectively ventilated but "effectively" is nowhere defined. The problem at present is that there are no further guidelines, codes of practice or other guidance with respect to indoor air quality. Guidance is all the more necessary because responsibilities for action and enforcement are spread among many government Departments and other bodies. In the United States, where there are many more modern "sealed" buildings with synthetic materials used in construction and furnishings, the problems have appeared earlier and more acutely. The consequence has been successful litigation against employers which may be emulated here as awareness grows.

7. During the course of this inquiry, we were told that the next decade will see vastly changing expectations regarding the environment within buildings. Just as people have become more aware of additives in food, so their awareness of the impact of the places in which they live and work is increasing—it is no good keeping minds and bodies fit if the majority of time is spent in an environment which creates lethargy, lassitude, headaches or upper respiratory tract infections.[1] We agree. Not much thought has been given to the indoor environment in recent years, although previous generations were in no doubt of the therapeutic value of fresh air. It is time to begin now.

2504086171

[1] Appendix 35.

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

SUMMARY OF RECOMMENDATIONS

8. Chronic conditions such as asthma and allergies often receive less attention than acute health problems. We recommend that the Government evaluate the costs of, and numbers of people who might be affected by, sensitisation, allergies and environmentally-triggered asthma. (paragraph 22);

We consider that the lack of information about indoor air quality issues has been a reason for the low profile of the problem, both in policy terms and in public perceptions. We therefore recommend that the Government identify, and where necessary commission the collection of, statistics on the indoor environment so that they may be published in forthcoming statistical reports on the environment and provide a sound basis for future policy development in this area. (paragraph 28);

We recommend that the Government clarify and simplify existing responsibilities for indoor air quality and review the operations of the Interdepartmental Liaison Group on indoor air quality. (paragraph 33);

We have previously recommended the formation of an Environmental Protection Agency or Commission. In our view, indoor air pollution is precisely the kind of complex and scientifically difficult subject which would benefit from a wider environmental perspective. (paragraph 34);

We recommend that the Government commission a wide-ranging review of indoor air quality policy, including matters of building design and construction, maintenance, leakage characteristics and ventilation rates for the various types of building and pollution to provide the framework for future policy in this area. (paragraph 36);

We recommend that the Government develop guidelines and codes of practice for indoor air quality in buildings, which specifically identify exposure limits for an extended list of pollutants based on possible total exposure (ambient, home and workplace). (paragraph 42);

We recommend that the DOE seek to ensure greater and better-targeted dissemination of its advice on indoor air quality to householders. This could include targeting home buyers and new tenants and explaining the need for ventilation. (paragraph 46);

We recommend that the Government clarify the respective responsibilities of environmental health officers and Health and Safety Inspectors for indoor air quality in non-domestic buildings and ensure that the guidance and resources are produced which will enable officials to address the issue of a comfortable and safe working environment in offices. (paragraph 48);

We consider the economic evidence on the significance of SBS to be of the greatest importance and we are disturbed by the attitude of the HSE. We recommend the HSE re-evaluate the cost and benefits of addressing SBS. (paragraph 55);

We welcome the Minister's commitment to greater involvement by HSE in research on SBS. However, we consider the research budget on the issue is still very small in relation to the apparent size of the problem. We urge the HSE and the Department of Employment to give greater priority to this issue in collaboration with DOE. We consider that there is a clear need for greater dissemination of information from BRE to environmental health officers and HSE through seminars or some other means. (paragraph 63);

We recommend the production of a best practice guide on the operation of buildings aimed at reducing the incidence of SBS. (paragraph 68);

We recommend the establishment of a self-financing inspection system, initially for commercial buildings, where the internal comfort criteria and associated building services plant are checked for compliance with design standards and codes of practice at regular intervals. (paragraph 74);

We recommend that building regulations be amended to ensure that the designers of buildings pay greater attention to issues of indoor air quality. This should include:

(a) requiring non-domestic buildings to be provided with adequate means of ventilation.

(b) ensuring attention is paid to the operational and maintenance needs of building services plant at the design stage, including adequate access space.

(c) requiring the use of building materials and surface finishes with the lowest pollutant emission properties. (paragraph 77);

2504086172

Z0200032696

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

We recommend that the building regulations are altered to require the provision of documentation to the building tenants, which details the environmental design criteria and the range of environmental controls available to individual occupiers and provides full operating and maintenance instructions. (paragraph 78);

We recommend that the Government consult professional bodies with a view to the DOE producing guidelines on a comfortable environment stressing temperature, humidity, individual control of environment and lighting. (paragraph 79);

We recommend that, in seeking to improve energy efficiency, the Government ensure that adequate attention is paid to ensuring appropriate ventilation for comfort and health. (paragraph 82);

We commend the establishment of BREEAM as a very positive approach to encouraging proper attention to environmental factors. We hope that it will be developed in order to cover indoor environment issues in greater depth and extended to existing buildings in order to encourage the better management of existing stock. (paragraph 84);

We recommend that the Government highlight the risks to children in its health education. Since environmental tobacco smoke cannot be dealt with separately from other pollutants in terms of health, good ventilation is paramount in minimising its effects. We therefore recommend that the HSE be given the necessary powers to promote this aim effectively. The Government should then accelerate the promised guidance on segregation of smokers and non-smokers and the rights of people to smoke-free air in work places and public places. This should be integrated with other guidance which is given under health and safety at work legislation and building regulations. (paragraph 98);

We consider that the rate of progress in identifying homes affected by radon prior to this campaign was much too slow. We recommend that the Government commit itself to ensuring the identification of the majority of homes above the radon Action Level by the year 2000. (paragraph 112);

We recommend that the Government act to ensure that where high risk homes are discovered other householders in the vicinity, likely to have equally high levels of radon, are approached and offered free surveys. (paragraph 114);

We recommend that the DOE seek to ensure that solicitors and other professionals are provided with the opportunity for education on the existence of radon and means to deal with it through seminars or some other means and draw the attention of professional bodies such as the Law Society and the RICS to this problem so that they might advise their members of the responsibilities they may have to client purchasers to ascertain the risk of radon in houses being purchased in certain parts of the country. (paragraph 115);

We recommend that the Government advise local authorities and other landlords of their responsibilities in radon-affected areas and prepare to allocate and where necessary increase the Housing Investment Programme funds to meet the additional needs of surveys and radon-proofing. (paragraph 119);

We consider that, in common with other health risks, funds should be made available to those who cannot afford to pay for remedial action. The current system does not appear to be working satisfactorily. We recommend that the DOE review the take-up of grants for radon-proofing. Should the situation not improve we recommend that the DOE develop a mandatory system of grant for radon-proofing, targeted at Affected Areas. (paragraph 120);

When NRPB is successfully surveying radon levels in thousands of homes, it is particularly unfortunate that the detailed guidance that is necessary for implementing radon-proofing is still not available. We recommend that the production of advice on radon-proofing be greatly accelerated. (paragraph 121);

We recommend that the Government seek to establish, in consultation with the building industry, a list of specialist radon-proofing contractors with appropriate knowledge and experience. (paragraph 122);

We recommend that those who are found to be exposed to high levels of radon at work are specifically targeted and advised to have surveys at home. (paragraph 123);

We recommend that the fitness standard be amended to include the requirement for adequate thermal insulation in relation to heating and ventilation systems. (paragraph 133);

2504086173

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

We recommend that legislation should be introduced to place Chief Environmental Health Officers under a duty to take action on damp and unfit public sector housing, but of course we accept this will have resource implications. (paragraph 135);

We consider that many people and designers would prefer to use products which have low chemical emission properties and do not contribute to indoor pollution and that labelling is the starting point. It is our intention to look in detail at the whole question of environmental labelling. Meanwhile, we recommend that emission characteristics and indoor pollution be included, where relevant, among the criteria against which applications for the award of an eco-label are to be judged. (paragraph 136);

2504086174

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

INTRODUCTION

9. The Environment Committee has for a number of years been carrying out inquiries into "green" topics and has made a large number of recommendations aimed at strengthening environmental protection. We have examined a wide range of issues, including air pollution, water quality in respect of rivers, estuaries and coastal seas, the impact on land of the disposal of toxic substances, the disposal and containment of radioactive waste, and the conservation both of the natural environment and of our historic buildings and monuments.

10. During this period, public concern about the environment has grown dramatically, to the extent that is has become a major political issue. However, one aspect of the environment stands out which we have not previously addressed and which seems to have received relatively little public attention in spite of the rapid growth of public awareness about environmental issues—the quality of the environment *inside* houses and other buildings and, in particular, indoor air quality.

11. In Britain's temperate climate we spend most of our time indoors: the Department of the Environment (DOE) told us that on average people spend 90 per cent of their time indoors.[1] It follows that exposure to pollutants in the home or in other buildings may have a greater impact on health than exposure from any other source. We therefore decided to carry out an inquiry into the way in which the design, construction, location and operation of buildings give rise to indoor pollution in its widest sense and affect the comfort and health of occupants. Our objective was to consider what action needed to be taken by the Government to improve the indoor environment.

12. Pollutants indoors can arise from many sources: the ground on which the building stands, its design (including ventilation systems) and contents, the activities which are carried on within it, and the quality of the external air which is used for ventilation purposes. The number of potential pollutants is enormous. The inquiry has concentrated on a number of key issues: "sick building syndrome", radon gas, environmental tobacco smoke (ETS), damp and mould and volatile organic compounds (VOCs). We specifically excluded from our inquiry the direct polluting effects of industrial processes *as such*, since they are matters for the Department of Health (DOH) and the Health and Safety Executive (HSE), and are the subject of specific controls.

13. In this Report, we examine first the wider problems of indoor air quality, in relation to human health. We make several recommendations for improving the Government's co-ordination of policy in this area, and for the production of appropriate guidance. We then look at so-called sick building syndrome and aspects of building maintenance and design, before going on to consider the specific issues of environmental tobacco smoke, radon gas, damp and condensation, and toxic substances. Our intention is to show that these apparently discrete subjects need to be tackled together as part of a coherent, structured approach.

14. We are indebted to all who assisted in our inquiry, whether by giving up time to meet us and answer our questions or by submitting written evidence. In particular, we benefited greatly from the advice of our Specialist Advisers: Mr Lawrence Davis FIBC, formerly Chief Building Control Officer, Solihull MBC, Mr David Lush FCIBSE, Technical Director, Ove Arup Partnership, Professor Nigel Bell, Professor of Environmental Pollution, Mr Richard Macrory, Barrister and Reader in Environmental Law, and Professor Roger Perry, Professor of Waste Management and Environmental Control, all of Imperial College, London and Dr Linda Rosborough, formerly Specialist Assistant to the Committee. As in previous inquiries, we have relied very heavily on the expertise of those who have been prepared to give up time to advise us, often at considerable personal inconvenience.

BUILDINGS AND INDOOR AIR QUALITY

15. On the positive side, buildings are better-heated, better-insulated, and less prone to draughts than formerly. The decline in the use of open fires and non-flued appliances such as paraffin heaters has reduced exposure to fumes and dust from burning fuels.[2] The switch from town gas to natural gas has reduced the risk of carbon monoxide poisoning. Because of the Clean Air Acts of the 1950s and 1960s[3] and changes in fuels used for heating, the quality of outside air has itself improved[4]; and since it is outside air which is used for ventilation, this in turn has improved many aspects of indoor air quality.

[1] Evidence p 2.

[2] Evidence p 21.

[3] Clean Air Act 1956, 1968.

[4] Although there have been general improvements in air quality it should be noted that levels of some pollutants such as NO_x and O_3 have increased over the same period and that the health effects of these have until recently been ignored.

2504086175

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

16. On the negative side, however, there has been a move away from natural ventilation of buildings, as a result of the installation of sealed glazing units and the tendency to remove chimneys from existing buildings and to omit them from new ones. Open fires used to be important in removing cigarette smoke and water vapour from houses; but houses no longer have a chimney in every room and this natural ventilation route has therefore been lost. In many commercial buildings there is no natural ventilation *at all*, and air conditioning has become much more prevalent. Moreover, as people have become more aware of the need to conserve energy they have tended to reduce the ventilation levels of buildings generally; and this has contributed to the retention of pollutants indoors.

17. The impact of reduced ventilation has been increased because modern building practice employs many more materials which have the potential to emit pollutants than was formerly the case. In addition to new building products and furnishing finishes, the activities of the occupants of the building import further potential pollutants, ranging from aerosol sprays to cleaning fluids.

18. Scientific advances in analysis have revealed the presence of hitherto unknown pollutants in indoor air, such as the radioactive gas radon (which occurs naturally) and have made it possible to identify the presence of small concentrations of pollutants which previously could not be measured. It is now known that people are exposed to a large and variable range of substances and organisms in indoor air—albeit mostly in extremely small amounts.[1]

19. A wide range of pollutants can be present in indoor air. Gases potentially present include combustion gases and vehicle emissions, such as oxides of nitrogen and sulphur, carbon monoxide, ozone from photocopiers and laser printers, radon gas and methane from the ground, as well as the numerous volatile organic compounds discussed in more detail in the next paragraph. Carbon dioxide which is exhaled by people can build up in the indoor environment and is used as an indicator of inadequate ventilation. Particulate matter is also present, including dusts from human skin, combustion and smoking, asbestos and mineral fibre. Particular activities can have important temporary effects: for example, the removal of old paint can result in high concentrations of lead in dust and the air.[2] Microbes are another potential pollutant: 20 per cent of the population can be sensitised by airborne fungal spores.[3] We were told by one consultant that he had identified over 30 different species of fungi and numerous bacteria inhabiting ventilating systems.[4] The faecal pellets of dust mites which feed on skin scales are a major cause of allergy in humans.

20. Attention has focused recently on the hundreds of organic chemicals present in indoor air: a study by the United States Environmental Protection Agency found more than 500 volatile organic compounds (VOCs) in a study of ten buildings, almost all at higher levels indoors than outdoors.[5] We were able to see this for ourselves when we visited the Building Research Establishment at Garston, Watford. We were shown chromatograms which illustrate the amount of VOCs in air (see Figure 1). Concentrations are higher indoors than outdoors and a house where painting has recently occurred has much higher concentrations of VOCs than normal. The use of wood preservatives also leads to increased levels of organic substances in the air and building or furnishing materials such as particle board and foamed insulation may emit formaldehyde.[6]

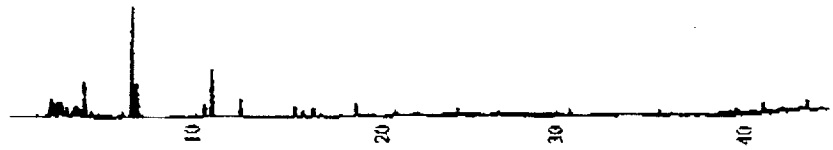
21. We received evidence that in seeking to ensure a satisfactory environment indoors, attention must also be paid to questions of comfort as well as to minimising the presence of pollutants.[7] Comfort criteria include temperature, humidity, and lighting. Studies of problem buildings have shown that to some extent, the problems are caused by dissatisfaction with heating control and lighting as well as other factors.[8] In addition, humidity and temperature are significant in encouraging the growth of microbes.

[1] Appendix 27.
[2] Evidence p 2.
[3] Appendix 36.
[4] Evidence p 63.
[5] Evidence p 62.
[6] Evidence p 2. *See* paragraph 46.
[7] Appendix 25.
[8] *See* paragraphs 49–68.

2504086176
Z0200032700
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

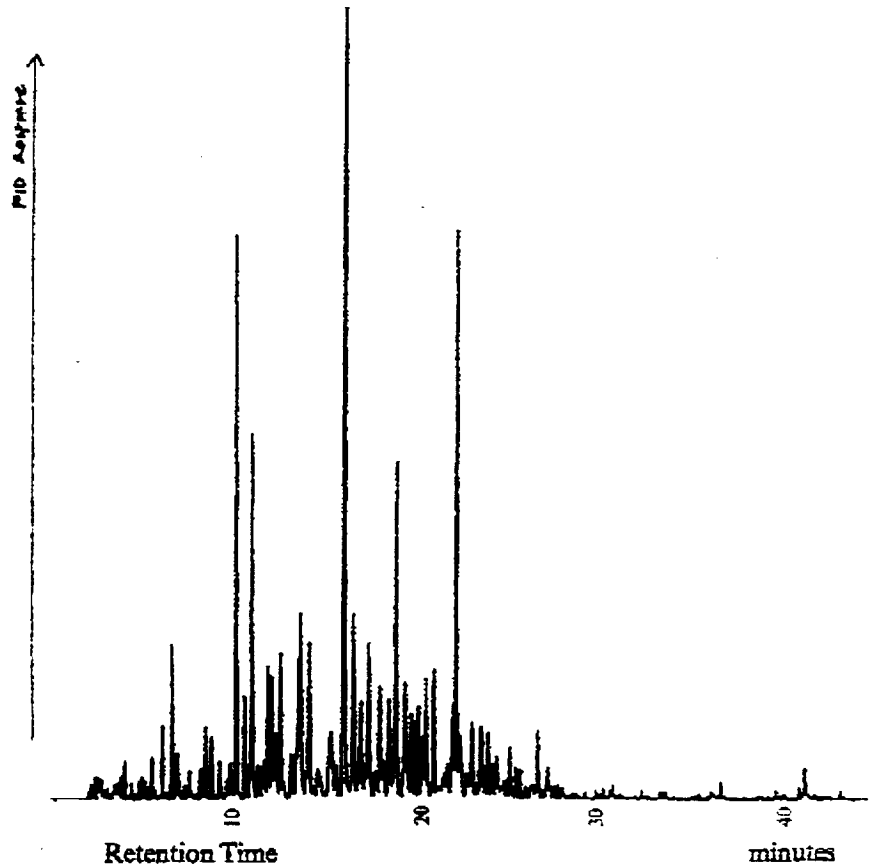
Figure 1

Chromatograms illustrating amounts of volatile organic compounds in air. The samples result from exposure of collecting tubes containing an absorbent material for 4 weeks. Analysis is by thermal absorption/gas chromatography with flame ionisation (FID) detection.



(i) Outdoor air.

(ii) Air in lounge of house with relatively low amounts of VOCs.



(iii) Air in lounge of house where painting of adjacent hall had occurred during the 4 week sampling period.

Source: Building Research Establishment.

2504086177

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

Health and indoor air quality

22. The Department of Health told us that changes in building design and construction and the greater use of chemicals indoors has had the effect of making the total exposure of individuals to pollutants indoors of comparatively greater importance to health than it was three or four decades ago.[1] Vulnerable people, such as children, the elderly and those with medical conditions, may be particularly susceptible to harm from pollution. There are also people who become sensitised to traces of irritants, which may even be at too low a concentration to measure. According to the Royal Society of Health more than 20 per cent of the population may fall into this category.[2] The National Asthma Campaign (NAC) told us that three million people have asthma in the United Kingdom and there is evidence to suggest that the total number is increasing by 5 per cent per annum.[3] The NAC suggested that indoor or outdoor pollution may be the cause of this increase but had no firm evidence to that effect.[4] Overall, there appears to be a worryingly large number of health problems which could be connected with indoor pollution and which affect very large numbers of the population. **Chronic conditions such as asthma and allergies often receive less attention than acute health problems. We recommend that the Government evaluate the costs of, and numbers of people who might be affected by, sensitisation, allergies and environmentally-triggered asthma.**

23. The Department of Health identified four key indoor pollution problems as issues for health.

—agents such as radon and ETS which are well recognised as potentially harmful, to which large numbers of people are exposed in relatively large concentrations, and which may have serious consequences for a small proportion of people, causing illness and death;

—a small number of very toxic and often carcinogenic substances, such as benzene and dioxin, for which even very low concentrations are of concern;

—substances such as VOCs which may have deleterious effects, particularly in combination; and

—particular *buildings* which are associated with higher than expected levels of illness, as exemplified by modern office buildings which exhibit the symptoms of sick building syndrome and by damp, poor-quality housing.[5]

The scale of the problem

24. It was difficult for us to obtain a true picture of the extent of problems and dissatisfaction with the indoor environment. The DOE told us that they do not carry out systematic surveys (with the exception of statistics on damp and mould collected as part of the House Condition Survey).[6] The HSE told us that the normal reporting procedures by local authority environmental health officers do not cover the symptoms normally associated with sick buildings,[7] nor does HSE keep statistics on air quality in offices.[8] The Chartered Institution of Building Services Engineers (CIBSE) told us that there is no central record of complaints on indoor air quality and no reporting mechanism has been established.[9] The Institution of Environmental Health Officers (IEHO), whose members bear the prime responsibility for inspecting offices in connection with health and safety, told us that with the exception of radon, its members do not initiate any work in relation to indoor air quality issues. In a small percentage of cases when EHOs are called in to investigate complaints about a building, indoor air quality issues will be found to be the cause of the problem.[10]

25. From the evidence which we received, however, it is clear that a number of consultants working in the field believe that problems with the air quality in buildings are widespread. Professor Burberry of UMIST described the present situation as one of

"widespread complaint and concern about comfort and health".[11]

[1] Appendix 27.
[2] Appendix 36.
[3] Appendix 8.
[4] *ibid.*
[5] Appendix 27.
[6] Q4.
[7] Q339.
[8] Q401.
[9] Q520.
[10] QQ964–966.
[11] Appendix 20.

2504086178
Z0200032702
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

Professor Alan Hedge of Cornell University, who has carried out a number of office surveys in Britain, told us of the

> "plethora of indoor air quality problems which are now being identified ..."[1]

The Robens Institute at the University of Surrey told us that no realistic estimates of the numbers of buildings affected exist but suggested that problems were widespread.[2]

26. Mr Gray Robertson, a consultant with Healthy Buildings International, told us that his surveys had shown that large numbers of people are suffering from symptoms associated with modern buildings and that the problem seems to be growing at an alarming rate.[3] He told us of a survey in the United States which compared the incidence of respiratory infections in people in modern sealed buildings and in naturally-ventilated buildings. The total sample size was 400,000 people; and they were studied over a four-year period. It was found that there was a 50 per cent increase in these complaints among those who worked in modern sealed buildings.[4]

27. Some indication of the seriousness of indoor pollution problems can be gained from the mortality and morbidity figures estimated to be associated with specific pollutants. According to official figures supplied by Government Departments and agencies, indoor pollution is significant in comparison with other risks to human health:

—radon	2,000 deaths per annum from cancer[5]
—condensation and damp	560,000 people need treatment because of allergies to mite and mould[6]
—carbon monoxide poisoning	100 deaths per year[7]
—environmental tobacco smoke	"several hundred deaths per year".[8]

To this must be added the chronic low-level illness which appears to be associated with modern offices; while this is not known to be life-threatening it does cause considerable discomfort to large numbers of people and can have a significantly deleterious effect on productivity. Mr Paul Appleby, of CIBSE, told us that in his view

> "the situation in this country is fairly serious when it comes to the incidence of not just sick buildings but problems in buildings in general and I think a central recording system would be extremely useful".[9]

28. In the recent White Paper on the Environment, the Government has already committed itself to an expanded statistical report on the environment in future.[10] This will be mainly concerned with the external environment but will include some data relating to internal conditions such as noise and radon concentrations in the home. **We consider that the lack of information about indoor air quality issues has been a reason for the low profile of the problem, both in policy terms and in public perceptions. We therefore recommend that the Government identify, and where necessary commission the collection of, statistics on the indoor environment so that they may be published in forthcoming statistical reports on the environment and provide a sound basis for future policy development in this area.** These statistics should include information on indoor air quality, including sick building syndrome, in various building types.

Government and legislation

29. Government responsibility for protecting the population from indoor pollutants is spread across a number of Departments and is exercised through a variety of pieces of legislation. The Department of the Environment outlined the situation in a number of supplementary notes to its original evidence.[11] The DOE is responsible for identifying potentially hazardous indoor air pollutants. Advice on risks to health is given by the Department of Health and other appropriate bodies such as the National Radiological Protection Board (NRPB). Policy for particular problems is developed in different departments with relevant expertise or appropriate administrative or legislative systems already in place.

[1] Evidence not printed.
[2] Appendix 11.
[3] Evidence p 77.
[4] Q 259.
[5] Evidence p 2.
[6] *Ibid.*
[7] Evidence p 3.
[8] Appendix 27. Department of Health. (This figure has, however, been disputed.)
[9] Q 521.
[10] 1990 *This Common Inheritance* Cm 1200.
[11] Appendix 31.

2504086179

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

22/07 '91 10:34 ☎61 02 259 6643 WILLS LEG/SEC --- PHILIP MORRIS 020
18 JUL '91 11:28 B A T 3RD FLOOR 071 222 5816 P.20/25

30. In consequence, the Department of Health takes responsibility for smoking and health and the Health and Safety Executive for gas and carbon monoxide poisoning. The Department of Trade and Industry (DTI) has responsibility for pollution resulting from consumer products such as furniture, carpets and aerosols. The Department of Employment (DEm) and the Health and Safety Commission have responsibility for the health of people at work, which includes the internal environment in the work place. The DOE has responsibility for policy on the design and construction of all new buildings (except those owned by the Crown). Departments with direct responsibilities for particular buildings such as the Department of Education for schools and the Home Office for prisons interpret the DOE/HSE policies to meet their own circumstances. Pesticides are the joint responsibility of the Ministry of Agriculture, DOE, DOH, DEm and the Scottish and Welsh Offices.

31. We are not convinced that the present division of responsibilities ensures that indoor air quality issues are dealt with consistently. A number of issues which led us to this conclusion are dealt with in more detail elsewhere in the report. They include:

—limited powers to take action over dampness in public sector housing.[1]

—lack of research on indoor air quality in commercial buildings.[2]

—the fact that there are at present no mandatory ventilation requirements for offices and neither HSE nor DOE seemed to think that this was their responsibility.[3]

—the recent review of the building regulations and health (the Mant Report) which was commissioned to contribute to a review of the building regulations is primarily concerned with housing.[4]

—failure to address public health considerations in DOE advice on indoor air quality issues.[5]

32. The lack of attention to issues of indoor air quality is illustrated by one example. We asked DOE officials whether there were any guidelines on ventilation or indoor air quality in underground car parks, which are often unpleasant because of fumes from car exhausts. They replied that the Department was currently consulting on mechanical ventilation for reasons of fire safety in underground car parks, and added that perhaps for presentation purposes the provisions should also be explained in terms of ventilation of fumes.[6] We are surprised that air quality issues should only occur as an afterthought in this way.

33. Co-ordination of responsibilities for indoor air quality is provided by the DOE, which chairs an Interdepartmental Liaison Group on indoor air quality. We question the effectiveness of the working of this committee. **We recommend that the Government clarify and simplify existing responsibilities for indoor air quality and review the operations of the Interdepartmental Liaison Group on indoor air quality.**

34. **We have previously recommended the formation of an Environmental Protection Agency or Commission.[7] In our view, indoor air pollution is precisely the kind of complex and scientifically difficult subject which would benefit from a wider environmental perspective.**

35. It seems to us that governments have never looked at indoor environmental quality issues as a whole. The legislation and standards which do exist have grown haphazardly. Aspects of the internal environment have been treated as a series of disconnected elements each falling under a different departmental umbrella. There is no uniformity and consistency in the attention paid to indoor air quality issues across the whole range of government responsibilities. Without a systematic overview, there is always the danger that important but unfashionable aspects (such as dampness) will be eclipsed by the more emotive issues of volatile organic compounds.

36. We consider that with responsibilities for indoor air quality so dispersed there needs to be a firm scientific base for policy. The Swedish Government provided us with a copy of a document on indoor air quality which had been prepared by the Nordic Committee on Building Regulations.[8] This is an extremely comprehensive review and makes recommendations covering maintenance, ventilation, cleaning of buildings, outdoor air quality, building design and construction, building

[1] Paragraph 135.

[2] Paragraph 61.

[3] Paragraph 76.

[4] D C Mant and J A Muir Gray, 1986, *Building Regulation and Health*, BRE.

[5] Paragraph 127.

[6] Q 97.

[7] HC (1988–89)22.

[8] Nordic Committee on Building Regulations NKB, 1990, *Indoor Climate—Air Quality, Draft for Comment*, Esbc

2504086180

Z0200032704

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

and the WHO has produced guidelines. We consider that architects and designers need clear guidelines to ensure that they take adequate account of indoor air quality issues. We have found on other inquiries[1] that the United Kingdom has been slow to take account of pollution recognised by other countries and we are anxious that this should not occur with indoor pollution. We consider the continuous exposure of the general population, young and old, to a mixture of pollutants to be quite different from the occupational exposure of workers to specific compounds. We are encouraged in this by the positive response Mr Trippier made to our suggestion of guidelines in our final evidence session.[2] **We recommend that the Government develop guidelines and codes of practice for indoor air quality in buildings, which specifically identify exposure limits for an extended list of pollutants based on possible total exposure (ambient, home and workplace).**

Implementation

43. The existing regulations on indoor air quality are enforced by local authorities, the DOE and other government departments. For example, the Health and Safety Commission has divided responsibility for enforcement of the Health and Safety at Work etc Act between local authorities and the Health and Safety Executive. Local authorities inspect offices, shops and restaurants. Factories, schools and hospitals are covered by the HSE.[3]

44. The DOE told us that responsibility for managing the risk of indoor pollution *in the home* is shared between Government and the public:

> "... the Government takes responsibility for ensuring that all dwellings are built with adequate ventilation, will take action to ban particularly hazardous materials over which the public has little control, eg blue asbestos and certain wood preservatives and will give advice on issues posing lesser risks, eg lead in old paint. The public also have their part to play; eg by maintaining adequate ventilation or use of DIY products in accordance with manufacturer's instructions. There is a limit to the controls which it would be appropriate to be exercised by Government in such cases."[4]

Much of the DOE's work on indoor air quality is therefore concerned with the provision of advice.

45. The DOE provided us with figures for the numbers of leaflets which had been distributed, primarily through local authorities.[5] We queried whether this advice was getting through, at the right time, to the people who actually need it.[6] Dr Fisk, Chief Scientist, DOE, told us that the Department does not monitor the uptake or acceptability of the leaflets which it produces in this field—although specific campaigns such as that on lead in paint have been conducted at the point of sale.[7]

46. We wonder whether the DOE's policy of stressing the responsibility of individuals to ensure adequate indoor air quality is realistic. There are vast numbers of new chemicals and the instructions for their use are often in tiny print and not very clear. Householders often have a wrong sense of priorities about the importance of ventilation and install sealed glazing units with no openable windows or block up air vents. This is partly because of all the public information campaigns which have encouraged people to conserve energy. Ignorance about some of the chemicals in use every day was illustrated by evidence we heard at BRE on the release of solvent vapours from interior paints. BRE experiments have shown that occupational exposure limits for solvents may be exceeded only 10 minutes after commencement of painting and neither natural nor forced ventilation can reliably ensure satisfactory levels.[8] **We recommend that the DOE seek to ensure greater and better-targeted dissemination of its advice on indoor air quality to householders. This could include targeting home buyers and new tenants and explaining the need for ventilation.** It should also include checking on the effects of the campaign—by sample surveys and by monitoring sales of paint containing lead, for example.

[1] HC (1983–84)446, Acid Rain.
[2] Q 1043.
[3] Appendix 31.
[4] Evidence p 4.
[5] Evidence p 15.
[6] Q 29.
[7] Q 35.
[8] Evidence p 230.

2504086181A

Z0200032706

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

materials and surface finishes among other issues. **We recommend that the Government commission a wide-ranging review of indoor air quality policy, including matters of building design and construction, maintenance, leakage characteristics and ventilation rates for the various types of building and pollution to provide the framework for future policy in this area.**

Guidelines on indoor air quality

37. There is no legislative requirement for specific standards of air quality or ventilation in the majority of building types.[1] A number of pieces of legislation do have a bearing on the internal environment, although this is not their prime purpose. These include housing legislation, health legislation, building regulations, and restrictions on the manufacture, import or use of certain substances.[2] In practice, however, these do not provide a comprehensive system of regulation of internal air quality; the applicability of all of them is limited to some extent. In addition, current legislation does not address modern expectations of comfort and health. (CIBSE guidelines on ventilation standards are in practice used by building services designers as the professional standards but these are purely voluntary and do not currently cover pollutants other than tobacco smoke and general odours.)

38. Current legislation assumes that outside air is "clean". This is not necessarily so; and the intake of polluted outdoor air has been implicated as a cause of a number of air quality problems in buildings.[3] CIBSE told us that the contaminant level of outdoor air was still sometimes too high for it to be used for ventilation without chemical treatment.[4] Poorly-sited air intakes can be a particular problem.[5]

39. Indoor air quality in commercial buildings is covered by the Health and Safety at Work Act 1974 and the Offices Shops and Railway Premises Act 1963. The Health and Safety at Work etc Act requires employers, as far as reasonably practicable, to provide a healthy and safe working environment.[6] Section 7 of the Offices, Shops and Railway Premises Act 1963 requires that commercial buildings should be effectively and suitably ventilated.[7] We received a number of submissions which said that without further guidance this legislation was too vague and could only be used to cover the most grossly unsatisfactory conditions.[8]

40. We questioned witnesses on the desirability of air quality guidelines or standards for pollutants such as carbon monoxide, oxides of nitrogen and sulphates, suspended particulates and ozone. The DOE told us that it would be difficult to regulate on the basis of air quality standards because so much depended on the use of the building.[9] The HSE told us that they already set guidelines and standards for occupational exposure and questioned the feasibility of environmental air quality guidelines. Mr Sykes told us

> "I know for example that in the United States our opposite numbers set standards for occupational exposure and the Environmental Protection Agency also sets environmental standards ... We would have great difficulty applying lower standards to one class of buildings than another. I do not think that we could justify doing that."[10]

41. On the other hand, CIBSE told us that the HSE occupational exposure limits were neither sufficiently broad nor suitable for application to more general situations, including children in schools.[11] They pointed out that in the United States a concentration of about one tenth of the occupational exposure limit standards is customary for schools, offices, and similar environments.

42. It seems to us that having a set of guidelines on acceptable indoor air is the most obvious starting point for an indoor air policy. This was recommended to us by CIBSE and by a number of other practitioners in the field.[12] We understand that many other countries already have standards

[1] Q 20.
[2] Evidence p 3.
[3] Evidence p 69.
[4] Q 566.
[5] Evidence p 69.
[6] Q 319.
[7] Evidence p 94.
[8] Appendix 1, Appendix 13.
[9] Q 97.
[10] Q 465.
[11] Evidence p 119.
[12] Evidence p 119, Appendix 2, Appendix 20.

2504086181
20200032705
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

47. The HSE told us that the main onus for ensuring adequate air quality for commercial buildings was on employers and this was enforced by environmental health officers, although HSE has responsibility for producing the appropriate guidance.[1] In contrast, the IEHO told us their members were only responsible for smaller offices, with HSE having responsibility for government and local authority buildings and the larger office blocks.[2] There is surely a need for greater clarification of just where responsibilities lie here. In any event, the IEHO told us that their members do not spend a lot of their time on indoor air quality issues, which have not been given the attention they deserve.[3] This is partly because EHOs act primarily on the advice of others and there is no formal advice on the matter from the Health and Safety Executive.[4] Mr Jukes of the IEHO told us that there was a lack of clarity in standards and a lack of clear advice which tended to obscure the issue.[5]

48. From the evidence we have received it seems that EHOs are the most appropriate officials to take responsibility for indoor air quality and it would seem from DOE evidence that in law they already have this responsibility.[6] **We recommend that the Government clarify the respective responsibilities of environmental health officers and Health and Safety Inspectors for indoor air quality in non-domestic buildings and ensure that the guidance and resources are produced which will enable officials to address the issue of a comfortable and safe working environment in offices.** Many of our following recommendations describe the sort of information this guidance should contain.

COMMERCIAL BUILDINGS AND SICK BUILDING SYNDROME

49. In a relatively short space of time the nature of buildings has changed. New systems of commercial organisation demand buildings with a style of internal arrangement which differs—in some cases very radically—from the traditional office-block. As a result, there is far less reliance on natural lighting and ventilation than formerly. Equally, traditional methods of construction, using natural materials and methods and designs which have changed little over hundreds of years, are being replaced by artificial environments which use mechanical equipment for environmental control in buildings constructed and furnished with new materials.[7]

50. We received a considerable amount of evidence from academics and consultants specialising in indoor air quality issues who were concerned about the environment inside modern offices. Professor Peter Burberry described the changes which have taken place in the office environment as follows:

> "The development of electric fans and fluorescent lights has made possible the provision of entirely artificial environments. Some aspects of this development are advantageous in that, when sources of pollution are known to exist, mechanical ventilation can be used to extract them at source. However, artificial environments which can be achieved may be intrinsically uncomfortable. Individual adjustment is not normally possible and in many cases the control systems and maintenance of the equipment will not permit adequate comfort levels or control pollution. The divorce of the interior world from any contact with the natural world can have psychological effects which heighten the physical ones."[8]

51. The problem is enhanced by changes in working practices. Office workers are now the largest employment group in the United Kingdom.[9] Large numbers of clerical workers spend their time at a computer terminal doing routine, repetitive work. We received a number of memoranda from unions concerned about the conditions faced by their members including the Banking Insurance

[1] Q 323, Q 333.
[2] Q 970.
[3] Q 967, Evidence p 243.
[4] Q 985.
[5] Q 966.
[6] Appendix 31.
[7] Appendix 20.
[8] *ibid.*
[9] Appendix 21.

2504086182
20200032707
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

and Finance Union and the Council of Civil Service Unions.[1] They gave us their view of a number of instances of situations in which problems had arisen. We have not had the views of the managers and owners of the buildings.

—A Scottish bank used a basement without natural light not designed for human occupation as working space for over 60 employees. Staff complained of dry atmosphere, poor lighting and claustrophobia, and insect infestation. In addition, they claimed to suffer headaches, colds and from skin rashes and lethargy. Initial investigations by the employer have revealed no specific causes and no further action has been taken.[2]

—Complaints of flu-like illnesses were made at the Milton Keynes Job Centre from its opening in 1980. After four years of pressure, an independent survey was carried out which found faults in the ventilation system and lighting control. Improvements were made which resulted in a dramatic drop in absenteeism.[3]

52. The IEHO also gave us a number of examples of problems involving their members:

—Telephonists in an office building in the Borough of Ealing complained of headaches, eye-strain and nausea and complained to the HSE. After a full investigation, it was found that the construction company had linked the ventilation system with the extractor system of the pollution control laboratory above from where emissions were being directly channelled into their workplace.[4]

—Sheffield City Council has had a stream of complaints about sick building syndrome in a number of buildings within the city centre but no cause has been identified.[5]

What is "Sick Building Syndrome"?

53. Sick building syndrome (SBS) is the name given to the condition in which the occupants of buildings experience symptoms which disappear soon after the affected people leave the building. It has been recognised by the World Health Organisation, which identifies the following typical symptoms. The WHO admits that it cannot clinically diagnose the illness and cannot therefore treat it medically.

Stuffy nose	Blocked, runny or itchy nose
Dry throat	Dry skin
Chest tightness	Watering or itchy eyes
Lethargy	Headache
Loss of concentration.[6]	

Such symptoms may arise from a variety of causes, and even in the best of buildings, up to 10 per cent of occupants may suffer problems with their environment. The problem is generally considered as SBS when 20 per cent of occupants are dissatisfied.

54. We found the term itself rather confusing, because different people tended to use it in different ways. In popular parlance, all problem buildings are described as suffering from SBS. On the other hand, the experts in the field draw a distinction between "sick buildings"—for which no single factor can be identified as the cause of the problem—and "problem buildings" which have a readily-identifiable cause such as badly-maintained ventilation systems. For example the Ealing office building mentioned above would not be considered as an example of SBS, since pollution from a known source was shown to be the cause. Because of the uncertainties about the causes of SBS and the rising levels of health-related problems in buildings there is an increasing use of the term Building-Related Illness (BRI) to cover the range of ailments which commonly affect occupants.

55. The significance of SBS is a matter of dispute. Studies of office-workers in Britain have suggested that about 30 per cent may have suffered from some form of illness as a result of problems in their working environment.[7] In a study carried out by the Building Research Establishment (BRE) into the

[1] Appendix 1, Appendix 4.
[2] Appendix 1.
[3] Appendix 4.
[4] Q 982.
[5] *ibid.*
[6] Appendix 34.
[7] Q 398.

2504086183

Z0200032708

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

costs of SBS, it was found that for one 18 storey office block housing 2,500 people, time was lost in reduced effectiveness, absenteeism, and in addressing the problem of SBS itself; the annual cost was estimated at £400,000.[1] It is not known how many buildings have serious problems; but on the basis of the BRE study it would not be unreasonable to suggest that the annual cost of SBS to the economy may well be many millions of pounds. While the BRE were unwilling to put a more precise figure on this cost, our own calculations lead us to believe it could lie between £330 million and over £650 million.[2] On the other hand, SBS does not give rise to life-threatening symptoms; and it is clear from the evidence which it gave to us that the HSE does not, therefore, see SBS as of great importance in comparison with the industrial accidents with which its Inspectors commonly deal, or with potentially-fatal illnesses such as Legionnaires' Disease.[3] **We consider the economic evidence on the significance of SBS to be of the greatest importance and we are disturbed by the attitude of the HSE. We recommend that the HSE re-evaluate the cost and benefits of addressing SBS.**

56. The causes of SBS are not well understood; it may well be caused by a combination of factors. Mr Gray Robertson, of Healthy Buildings International Inc, believed that better ventilation alone could solve most instances of SBS. He suggested that many indoor pollutants—of which the most obvious is tobacco smoke—accumulate in air-conditioned offices because of poorly-designed or poorly-maintained ventilation systems.[4] He quoted evidence of a survey conducted by Honeywell which indicated 80 per cent of problem buildings were the victims of faulty operation of the ventilating system.[5] His conclusion was that the most effective vehicle for ensuring cleaner indoor air was legislation on minimum standards of ventilation, filtration and hygiene.[6]

57. This view was modified by representatives of CIBSE. They told us that although there was a lot of American evidence to support this contention, this was because of the history of ventilation standards in the United States.[7] Because of the need to save energy in the 1970s the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) slashed ventilation standards by a factor of three.[8] The buildings constructed to these standards have caused the problems and ASHRAE has twice since then revised its ventilation standards which are now similar to the pre-1973 levels. According to CIBSE and the HSE the situation in Britain has not been the same since ventilation standards were never reduced and have been increased for certain situations, for example, smoking areas.[9]

58. Government experts also suggested that better ventilation was not the whole answer to indoor pollution. Mr Sykes, the HSE specialist on SBS, told us that

> "While I hesitate to say that adequate ventilation would always overcome a problem, where there have been problems, in many cases increasing the ventilation rate has improved conditions. ... to a point [Mr Gray Robertson] is right but I would not go all the way with him."[10]

Mr Gary Raw of BRE told us that from the evidence of the few good, properly controlled studies of SBS, ventilation should not be regarded as the primary cause or the first-choice cure for SBS.[11] He said

> "... adequate ventilation is necessary for health and comfort but current studies provide no evidence that existing guidance on the design ventilation rates contributes to SBS. However it continues to be incumbent on the designers and operators of buildings to ensure that commissioning, maintenance and cleaning of systems are both feasible and actually undertaken in order to minimise any possible contribution of these factors to SBS."[12]

---

[1] Q 926.

[2] There are approximately 71 × 10^6m² of commercial office space and using the norm of 10m² per person there are around 7·1 × 10^6 people working in offices. Assume that a maximum of 16 per cent work in air conditioned offices and that SBS symptoms in naturally and mechanically ventilated buildings do not exceed half those in air conditioned buildings. On these figures the extrapolation of the £400,000 cost mentioned earlier would be £659 × 10^6. Even if the quoted building is particularly bad and the figure is halved it represents an annual loss of £330 million.

[3] QQ 351, 352.

[4] Evidence p 71.

[5] Q 283.

[6] Q 297.

[7] Q 529.

[8] Evidence p 66.

[9] Q 529, Q 404.

[10] Q 404.

[11] Appendix 33

[12] *Ibid.*

2504086184

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

59. Much of the other evidence we received stressed the varying potential causes of SBS, and hence the varying solutions. BRE told us that steam-cleaning of furnishings killed most of the dust mites present and in a controlled experiment led to a reduced incidence of symptoms of SBS.[1] A consultant physician stressed that lack of individual control over the work environment was a cause.[2] The Royal Society of Health stressed the significance of microbes. Professor Alan Hedge told us that his research has shown that neither indoor air pollutants nor ambient conditions are solely responsible for SBS complaints in buildings. A study of 4,373 United Kingdom office workers at 47 offices found a higher prevalence of SBS symptoms in air conditioned office buildings compared with naturally ventilated offices. However, the study showed that non-environmental factors also influenced the prevalence of SBS symptoms such as hours of video terminal use, job stress, and gender of the workers.[3]

60. Reviewing the contradictory evidence on the causes of SBS, Mr David Lush concluded that the body of evidence suggested that SBS is caused by a mixture of factors but that the mix and weighting of each factor is indeterminate. The contributory factors are as follows:

—Internal environmental specification
—Internal ambience—colour/reflectances
—External awareness—size, colour and type of glazing
—Pollutants created internally
—Level of boredom associated with the work tasks
—Quality of management
—Maintenance (or lack of it)
—Perceived lack of environmental control
—Acoustic problems
—Lack of fresh air, stuffiness, too much air movement
—Unacceptable temperatures and, possibly, humidity
—Lighting problems.[4]

61. There is an obvious need for more research on SBS and indoor air problems with buildings. CIBSE told us that Britain was lagging behind other countries in its work on indoor air quality.[5] BRE told us that it was carrying out research to assess the impact of SBS on occupants' health and the economy and to provide advice on remedial measures. CIBSE told us that this work was limited to one building, and that there is a need for more research of a multidisciplinary nature.[6] The point was made to us that central and local government employ more than half of all office workers yet have put little into dealing with SBS.[7]

62. Given that, in policy terms, SBS is a matter for the HSE (since it relates to health and safety in the workplace) we were rather surprised that DOE was taking the lead on research in this area, and wondered if this might impede the incorporation of research findings into the development of policy. Mr Trippier evidently shares this view:

> "... it is my opinion that we have not been talking often enough to the HSE about our research on sick building syndrome; new links have now been established between BRE and the relevant HSE specialists."[8]

63. **We welcome the Minister's commitment to greater involvement by HSE in research on SBS. However, we consider the research budget on the issue is still very small in relation to the apparent size of the problem. We urge the HSE and the Department of Employment to give greater priority to this issue in collaboration with DOE. We consider that there is a clear need for greater dissemination of information from BRE to environmental health officers and HSE through seminars or some other means.**

[1] Q 932.
[2] Appendix 21.
[3] Appendix 23.
[4] Appendix 34.
[5] Q 598.
[6] *Ibid.*
[7] Appendix 21.
[8] Q 1044.

2504086185

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

64. It seems to us that although no-one knows the cause of *every* instance of SBS, there is some knowledge of the causes of problems with the internal environments of buildings. Some of these contribute to SBS, while some present other difficulties. Artificial environments are still novel; and the evidence which we received indicates that there is considerable ignorance among architects, building operators and designers about their creation and maintenance.

65. It is inevitable that in making decisions one issue has to be balanced against another. In the absence of any clear guidance it is very easy for issues relating to indoor pollution to be overlooked.

66. We found considerable unanimity on the need for greater guidance on the internal environment to safeguard comfort and health. The professional organisations all called for guidelines, standards and codes of practice to ensure that indoor quality issues are taken into account.[1] For example, the British Occupational Hygiene Society recommended that criteria should be established for comfort and health; periodic deep cleaning of fabrics and carpets should be promoted.[2]

67. The CBI and the TUC both stressed the need for urgent guidance. The CBI said

> "We believe that the subject of indoor pollution is best dealt with by clear and authoritative advice
>
> (a) to the internal and external designers of buildings, ensuring that they take account of SBS factors from the start and give proper regard to possible future changes in use and layout;
>
> (b) to the occupiers of buildings, to show how layout, maintenance and so on can be optimised to keep the prospects of SBS as low as possible."[3]

The CBI also stressed that this should be provided without delay even though lack of knowledge meant it could only be preliminary.

68. The TUC told us that current legislation such as the Offices, Shops and Railway Premises Act no longer reflects current working activities and that there is a need for new guidance backed up by legislation to protect the health of workers in offices.[4] The Banking, Insurance and Finance Union said that the Offices, Shops and Railway Premises Act was too restricted to ensure a safe and wholesome atmosphere at work because of its lack of reference to the quality of air.[5] **We recommend the production of a best practice guide on the operation of buildings aimed at reducing the incidence of SBS.** We examine the detailed topics below.

Maintenance

69. One of the biggest problems with modern office buildings is their maintenance needs. Buildings of traditional construction tend to require little or no maintenance of their heating and ventilation systems—the heating systems were often unsophisticated, while ventilation was usually provided by natural means such as opening windows. The importance of maintenance for air-conditioned buildings, however, is not always appreciated. The Heating and Ventilating Contractors' Association (HVCA) gave us a catalogue of the problems which can arise because of inadequate maintenance and poor operation of air-conditioning systems. Ducting is prone to act as a breeding ground for bacteria because of the dirt which accumulates and the warm temperatures.

70. This is particularly the case if systems are shut down over the weekend to save energy. The HVCA told us that finding dead rodents and birds, and live insects in ducting was not uncommon. Moreover, dirt and dust accumulated during the construction of the building is often not cleaned off; and it is seldom, if ever, that duct cleaning forms part of maintenance operations.[6] The HVCA states that there is a tendency for building owners and operators to ignore good practice in operating heating and ventilating systems in the interests of cost and energy savings. Responsibility for following good practice must rest with the owner or occupant of the building; and the HVCA points out that failure to do so is misguided because of the health problems which can occur as a result of poor building maintenance.[7]

[1] Appendix 2, Q 565, Q 582 and Evidence p 243.
[2] Appendix 2.
[3] Appendix 3.
[4] Appendix 13.
[5] Appendix 1.
[6] Appendix 7.
[7] *Ibid.*

2504086186

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

71. CIBSE representatives also confirmed that standards of maintenance in this country are bad.[1] They considered that the main reasons for this were:

—the low status and training of maintenance personnel who are often ill-equipped to carry out very difficult tasks on what are becoming more and more complex buildings;[2]

—poor design, such as providing insufficient access to equipment to enable the occupants to maintain it; and

—cost-cutting and inappropriate intervals of maintenance.[3]

72. We questioned the HSE closely on inspection of commercial buildings; in a supplementary note the HSE explained that it was not normally possible to detect inadequacies in ventilation systems or their maintenance during routine inspection.[4] Moreover, because there are no standards or guidelines to which reference can be made in the Courts, under the current law it is difficult to proceed against occupiers who operate unsatisfactory ventilation systems.[5] The BIFU told us that since the legislation uses undefined terms such as "suitable" and "adequate", experience suggested that many employers would regard whatever ventilation they provide as sufficient within the meaning of the Acts.[6] Equally, there is no definition of acceptable levels of humidity or maximum permitted temperature (although a minimum temperature of 16°C must be achieved within one hour of starting work).[7]

73. In response to our questioning on air quality standards in commercial buildings the HSE produced a suggested basis for regulating ventilation systems:

"—that installers of forced ventilation systems be required to provide users with a statement of ambient parameters to be achieved in all parts of the building and a schedule of maintenance;

—that operators be required to operate the system to meet its design parameters, follow the schedule of maintenance and keep records; [and]

—that occupiers also be required to have periodic examinations and tests of the system undertaken by a competent person."[8]

However, the HSE points out that the compliance costs of such regulations would be large. Moreover, since all health and safety legislation must be justified on the basis of relative costs and benefits, the HSE questions whether the value of such regulations could be demonstrated.

74. We do not agree with the judgement of the Health and Safety Executive as to the value of requiring building owners and occupiers to maintain ventilating systems either in accordance with the manufacturer's schedule or with guidelines produced by the HSE, nor do we consider that a self-financing MOT-type test for mechanically-controlled environments in buildings would be at all unreasonable. We see nothing particularly onerous in such measures; good firms will already follow both these practices. **We therefore recommend the establishment of a self-financing inspection system, initially for commercial buildings, where the internal comfort criteria and associated building services plant are checked for compliance with design standards and codes of practice at regular intervals.** The inspection authorities could be HSE or local authority environmental health officers.

Building regulation

75. New buildings are subject to regulation in order to protect health and safety and to conserve energy. The building regulations do not deal with indoor pollution as a specific subject, but requirements for ventilation, and for preventing the ingress of toxic fumes from cavity wall insulation and contaminated land address the problem to an extent.

[1] Q 573.
[2] *ibid.*
[3] Q 575.
[4] Appendix 29.
[5] *ibid.*
[6] *ibid.*
[7] *See* paragraph 79.
[8] Appendix 29.

2504086187

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

76. We spent some time discussing the ventilation provisions of the Building Regulations which reveal their current limitations with respect to indoor air quality issues. The main deficiency is that the requirement for adequate ventilation in the Building Regulations does not apply to all building types. DOE officials told us

> "... in the Building Regulations we have not made regulations which are aimed at the ventilation of commercial buildings, apart from bathrooms and sanitary conveniences in commercial buildings ... The reason we have not done so is that we rely on HSE who have the responsibility for comfort, safety and convenience of people in the workplace. We leave them to regulate on conditions within the workplace."[1]

The HSE told us that their concern was with buildings in use and they would not in any way attempt to control how a building was constructed.[2] This appears to us to be an area where the division of responsibilities has led to incomplete control. In our final session the Minister, Mr David Trippier, accepted that the co-ordination between HSE and DOE on indoor air quality issues was unsatisfactory.[3]

77. We heard considerable evidence that many architects and designers of buildings do not take adequate account of indoor air quality issues[4] and we consider that changes in the building regulations are the most appropriate way of ensuring that more notice is taken of indoor pollution at the design stage. Design decisions can influence air quality in a number of ways. We have already discussed the issue of ventilation. A second problem is accessibility of plant. The CIBSE told us that in some buildings ensuring adequate maintenance of heating and ventilating systems is a problem specifically because designers have failed to provide adequate accessibility and proper access space.[5] These faults may result from developers not being prepared to allow sufficient space for plant capable of providing full fresh air systems or for maintenance access. Thirdly, there is the issue of pollutants emitted by construction products and finishes and fittings. The Building Regulations already make provision for reducing the emission of formaldehyde from cavity wall insulating foam but other products also emit formaldehyde and other pollutants. **We recommend that building regulations be amended to ensure that the designers of buildings pay greater attention to issues of indoor air quality. This should include**

(a) **requiring non-domestic buildings to be provided with adequate means of ventilation.**

(b) **ensuring attention is paid to the operational and maintenance needs of building services plant at the design stage, including adequate access space.**

(c) **requiring the use of building materials and surface finishes with the lowest pollutant emission properties.**

78. Many problems occur in buildings because they are not used as originally intended. The building of partitions, for example, may interfere with air movement patterns.[6] Dr Burge, of Solihull Hospital suggested that building ventilation systems should have written instructions on their use and written limitations on their design, such that if the building cannot be divided up into smaller offices with the existing ventilation system this should be clearly specified in the building and ventilation documentation.[7] **We recommend that the building regulations are altered to require the provision of documentation to the building tenants, which details the environmental design criteria and the range of environmental controls available to individual occupiers and provides full operating and maintenance instructions.**

Comfort and health

79. While it is impossible to design an environment that is comfortable for everyone, evidence suggests that comfort can affect occupants' efficiency and health. Temperature is one of the most contentious issues. The BIFU told us that they receive numerous complaints from members about high temperatures in summer

> "Even before the present series of hot summers commenced, the union was accustomed to receive numerous complaints from members concerning high temperatures and excessive humidity in Banks and offices as soon as summer began. Over the last two or three years the

[1] Q 17.
[2] Q 373.
[3] Q 1044.
[4] Evidence p 126, Appendix 20, Appendix 24.
[5] Q 574.
[6] Appendix 24.
[7] Appendix 21.

2504086188

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

22 07 '91 10:42 ☎61 02 259 6643 WILLS LEG SEC →→→ PHILIP MORRIS ☑030
18 JUL '91 11:44 B A T 3RD FLOOR 071 222 5816 P.6/21

number of complaints and queries to BIFU Headquarters alone have increased alarmingly to the extent where in the summer of 1990 it was not uncommon to start receiving calls of complaint at 8.30 these calls continuing incessantly until 17.00 hrs.

The most common cause of complaint was that the temperature and humidity at the workplace was too high, the maximum temperature reported to BIFU being 38°C ..."[1]

The only regulations relating to temperature are the minimum of 16°C to be achieved within one hour of starting work[2] and The Fuel and Electricity (Heating) (Control) (Amendment) Order 1980 which requires the conservation of energy by prohibiting the use of energy to achieve a temperature in excess of 19°C. This, according to BIFU, is too cold for people engaged in sedentary, clerical work.[3] **We recommend that the Government consult professional bodies with a view to the DOE producing guidelines on a comfortable environment stressing temperature, humidity, individual control of environment and lighting.**

Energy efficiency and indoor air quality

80. BRE told us that Britain's buildings are extremely "leaky" compared with North America and Scandinavia (see Figure 2). The Government is committed to improvements in energy efficiency and, for example, has undertaken to reduce the total energy bill for the Government estate by 15 per cent over the next five years.[4] We were concerned about the effect that this could have on air quality in the buildings concerned if pursued without proper attention to ventilation needs.

81. Well-meaning attempts to save energy have been the cause of some of the most polluted buildings. We have already described the complete about-turn which ASHRAE has been forced to make on ventilation standards because of failing to appreciate the importance of ventilation in maintaining a healthy environment.[5] One consultant told us that he had come across buildings where the air inlet of the ventilation system had been bricked up because of over-zealous emphasis on energy efficiency.[6] CIBSE representatives told us that there is a conflict between energy efficiency and the need for adequate ventilation but with attention paid to heat recovery from the extract air it is possible to achieve energy savings without sacrificing ventilation.[7]

82. We think that there needs to be a much greater public awareness of the balance between energy conservation and ventilation. Our colleagues on the Energy Select Committee have recently recommended that the DOE revise the building regulations with a view to raising the standards of energy efficiency.[8] We do not demur, but a balance has to be struck. **We recommend that, in seeking to improve energy efficiency, the Government ensure that adequate attention is paid to ensuring appropriate ventilation for comfort and health.**

BRE Environmental Assessment Method

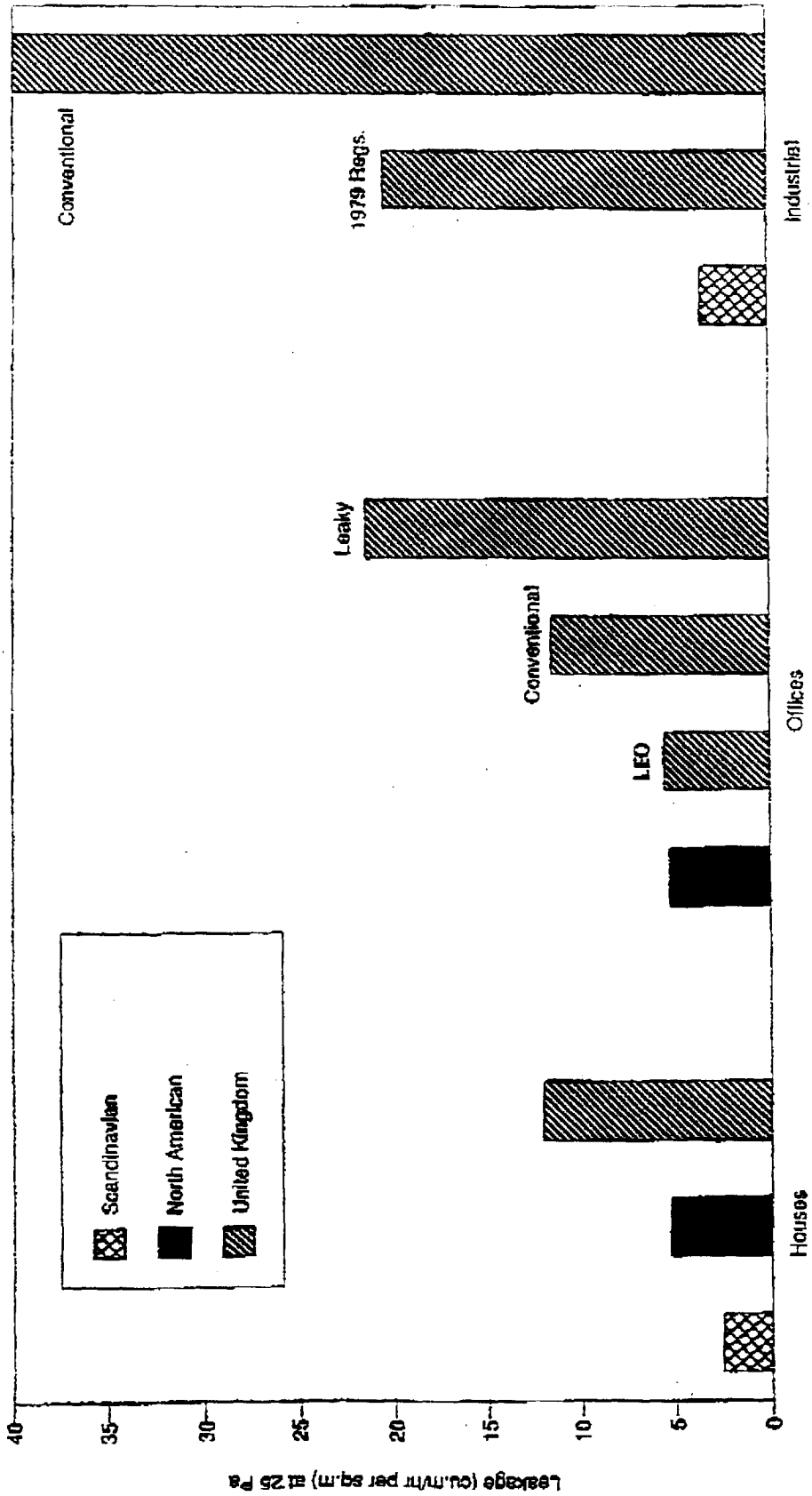
83. The BRE has developed a system of environmental assessment for new office building which is called BREEAM (BRE Environmental Assessment Method).[9] Its aim is to encourage the design and construction of buildings which have less impact on the environment than normal. It is a voluntary scheme and self-funding. Buildings are assessed in term of their effects in relation to global environmental problems such as use of energy and emission of CFCs as well as the internal environment provided.[10] It is intended to extend the scheme to cover other building types.

84. The BREEAM scheme is intended to give guidance to those companies which wish to go beyond existing regulations and achieve higher standards than required in legislation in efficient use of resources and in providing a good environment. This is very much to be applauded. However, we understand that the scheme is at a fairly rudimentary level as yet.[11] **We commend the establishment of BREEAM as a very positive approach to encouraging proper attention to environmental factors. We hope that it will be developed in order to cover indoor environment issues in greater depth and extended to existing buildings in order to encourage the better management of existing stock.**

[1] Appendix 1.
[2] Regulations made under the Offices, Shops and Railway Premises Act 1963.
[3] Appendix 1.
[4] 1990, *This Common Inheritance*, Cm 1200.
[5] Paragraph 57.
[6] Q 289.
[7] Q 585.
[8] HC, 1990–91, 91 paragraph 104.
[9] Q 959.
[10] *Ibid.*
[11] Q 556.

2504086189
20200032714
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

Figure 2.
Fabric Leakage of Different Building Types in Different Countries



Source: Building Research Establishment.

250408190

Source: https://www.industrydocuments.ucsf.edu/docs/qphl0000

2020032715

ENVIRONMENTAL TOBACCO SMOKE

85. Tobacco smoke is the most visible pollutant present in indoor air and is inhaled involuntarily by non-smokers in the company of smokers. This is described as passive smoking. There is scientific dispute about its health effects but it is undoubtedly irritating to many people. We took oral evidence from ASH, the anti-smoking pressure group and scientists from the British American Tobacco Company Ltd. We also received evidence from scientists and a number of organisations with an interest in the issue including the Association for Nonsmokers' Rights (Dorset)[1], the British Occupational Hygiene Society[2] and the Tobacco Advisory Council[3] as well as the Government Departments involved.

86. The Government's policy on passive smoking is to support the setting up of voluntary smoking policies and the provision of smoke free areas in public places and work places.[4] It is based on the findings of the Independent Scientific Committee on Smoking and Health, which concluded in 1988 that there is a 10–30 per cent increase in the risk of contracting lung cancer for non-smokers habitually exposed to tobacco smoke.[5] In the White Paper on the Environment, the Government has undertaken to publish new guidance on best practice in segregating smoker and non-smoker.[6]

87. The desirability or otherwise of reducing the exposure of non-smokers to environmental tobacco smoke through greater controls over smoking was the most contentious issue of our inquiry. We found that the tobacco industry and the health related bodies are in complete opposition in their interpretation of present knowledge about the health effects of passive smoking and in their belief in the value of ventilation as a solution to indoor pollution.

88. The two conflicting views were most starkly presented during our oral evidence session with Action on Smoking and Health (ASH) and British American Tobacco (BAT). ASH representatives told us that the weight of scientific evidence shows passive smoking causes lung cancer and cited an impressive list of weighty authorities which had come to this view after reviewing the evidence, including the World Health Organisation and the United States Surgeon General.[7] However, BAT representatives told us that it was not proven that exposure to environmental tobacco smoke was harmful and that

> "To date, 23 epidemiological studies have investigated possible associations between ETS and non-smoker lung cancer. Of these, only five have claimed a statistically significant association between being married to a smoker and the increased incidence of lung cancer in non-smokers. The remaining 18 studies have found no such association."[8]

Since the increased risk is small (10 to 30 per cent).

> "Many experts in epidemiology state that it is just not possible to rely on the epidemiological technique at such low levels of possible risk."[9]

89. Sir Richard Doll, on behalf of ASH, said that the key factor was the dose of carcinogens received; it was known that there were about 50 carcinogens in tobacco smoke which would have an effect proportional to the dose—the only matter for debate was the size of that effect.[10] ASH also claimed that

> "... whatever confusion which may exist in the public mind about this evidence has been generated by the tobacco industry, which has consistently misrepresented genuine independent scientific data on passive smoking, as it has always done on direct smoking."[11]

Dr Boyse of BAT, on the other hand, contested the validity of the methodology for identifying carcinogens and claimed that the concept of no safe threshold for a carcinogen was now challenged.[12]

---

[1] Evidence not printed.
[2] Appendix 2.
[3] Evidence not printed.
[4] Evidence p 10.
[5] *ibid.*
[6] 1990, *This Common Inheritance*, Cm 1200, HMSO.
[7] Evidence p 180.
[8] Evidence p 201.
[9] *ibid.*
[10] Q 774.
[11] Evidence p 180.
[12] QQ 838, 839.

2504086191

Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000

90. A number of scientists have carried out measurements of the actual contribution made by tobacco smoke to the pollution load in air in various locations. BAT told us that their studies revealed that the contribution made by smoking to indoor air pollution in a pub, for example, was quite small in comparison with the contribution from motor vehicle emissions, from cooking and from furnishings.[1] The importance of vehicle emissions in indoor air quality was endorsed by evidence we saw at BRE of pollution levels in naturally ventilated buildings near busy roads. Dr Proctor of BAT told us that the real problem with indoor air quality was inadequate ventilation rather than tobacco smoke—

> "... when we have compounds in the air that can be removed, ventilation is the only means ... the tobacco smoke happens to be the very visible portion of anything that may be in the air, all the other stuff is there anyway. If you see tobacco smoke hanging around in atmospheres there is a pretty good chance the ventilation systems are not correct."[2]

91. However, ASH told us that ventilation was not the answer to tobacco smoke since it did not provide protection from the smoke which drifts straight from a cigarette and mechanical ventilation systems remove very little of the gases produced in smoke.[3] They claim that tobacco smoke is a significant contributor to sick building syndrome, and can be a cause of the problem even in well ventilated offices.[4] This contrasts with some of the evidence we had received earlier, which suggested that tobacco smoke causes a very small percentage (3 per cent according to one United States study) of instances of SBS.[5] However, other evidence suggests that symptoms of SBS increase when the building contains more active smokers.[6]

92. There appears to be less scientific dispute about the effects of environmental tobacco smoke on young children. The greatest exposure to tobacco smoke takes place in the home.[7] A number of studies have demonstrated a link between parental smoking and the incidence of respiratory disease in young children.[8] BAT scientists, in evidence to us, did not contest the results of these studies but claimed it was premature to conclude that the relationship was causal.[9]

93. The Independent Scientific Committee on Smoking and Health reviewed the evidence in 1988 and stated

> "... most of the scientific groups conclude that while none of the studies can on its own be accepted as unequivocal the findings overall are consistent with there being a small increase in the risk of lung cancer from exposure to environmental tobacco smoke, in the range 10 per cent–30 per cent, although some other workers have however argued for a much lower relative risk, or no increased risk at all. The Committee, studying the same data, agrees with the former interpretation ..."[10]

They estimated that several hundred out of the current total of about 40,000 lung cancer deaths per year are caused by passive inhalation of environmental tobacco smoke.[11] The Independent Scientific Committee on Smoking and Health has therefore recommended that non-smoking should become the norm in all public places and workplaces, with special provision made where needed for smokers. That Committee did not consider that increased ventilation was an appropriate answer, although it could be needed to reduce exposure to other air pollutants.

[1] Q 847.
[2] Q 857.
[3] Evidence p 181.
[4] *ibid.*
[5] Q 296
[6] Appendix 21.
[7] Evidence p 210.
[8] *Fourth Report of the Independent Scientific Committee on Smoking and Health, 1988*, HMSO.
[9] Q 883.
[10] *Fourth Report of the Independent Scientific Committee on Smoking and Health, 1988*, HMSO.
[11] *ibid.*

2504086192
2020032717
Source: https://www.industrydocuments.ucsf.edu/docs/qqhl0000